Dell™ PowerEdge Expandable RAID Controller 3/QC, 3/DC, 3/DCL and 3/SC

WebBIOS Configuration Utility Guide

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SECTION 1

WebBIOS
Configuration Utility

Features

The WebBIOS Configuration Utility allows you to configure and manage RAID arrays and logical drives. WebBIOS is an HTML-based utility that is embedded in the firmware in the PERC 3 controller.

NOTE: The term "PERC 3" in this document refers to PERC 3/QC, PERC 3/DC, PERC 3/DCL, and PERC 3/SC.

NOTE: The BIOS Configuration Utility (<Ctrl> <M>) is also used to configure and maintain RAID arrays, and logical drives and to manage the RAID system. This character-based utility is independent of any operating system. Refer to the *PERC 3 User's Guide* for more information. The WebBIOS Adapter Selection screen has a button you can click to go to the BIOS Configuration Utility. One difference between the programs is that WebBIOS can perform reconstructions, but the BIOS Configuration Utility cannot.

The WebBIOS Configuration Utility configures disk arrays and logical drives. Because the utility resides in the BIOS, its operation is independent of the operating systems on your computer. The WebBIOS utility can be used to:

- Display adapter properties
- Scan devices
- Display SCSI channel properties
- Define logical drives
- Initialize logical drives
- Check data for consistency
- Configure physical arrays
- Reconfigure existing arrays (RAID level migration and capacity expansion.)
- Select adapters
- Display the physical properties of disk drives

You can use the Configuration Wizard to guide you through the steps required for configuration.

Starting the WebBIOS Utility

When the host computer boots, hold the <Ctrl> key and press the <H> key when the following text appears:

```
Copyright© LSI Logic Corporation
Press <Ctrl><M> to Run Configuration Utility
Or press <Ctrl><H> for WebBIOS
```

After you press <Ctrl><H>, the **Adapter Selection** screen displays. You use this screen to select the adapter that you want to configure. Select an adapter and press **Start** to begin the configuration. If you want to use the BIOS Configuration Utility instead of WebBIOS, click the **Control-M** button.

Adapter Selection Screen
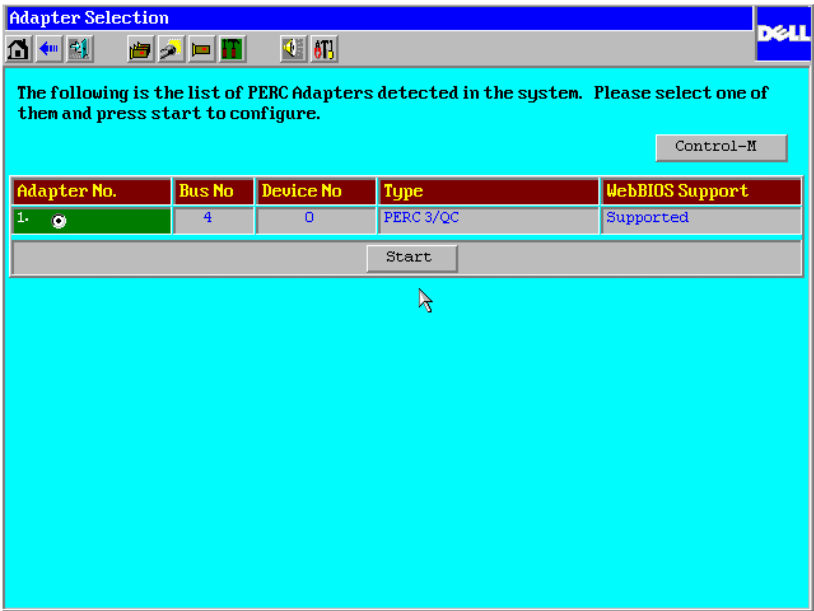
Main Menu Screen

The **Main Menu** screen displays a menu of items that you can select to display information and make changes to the RAID arrays attached to PERC 3 controllers in the server. The screen also displays the current configuration of the physical and logical drives. From this screen, you can configure and manage the RAID arrays on the server.

WebBIOS Main Menu Screen
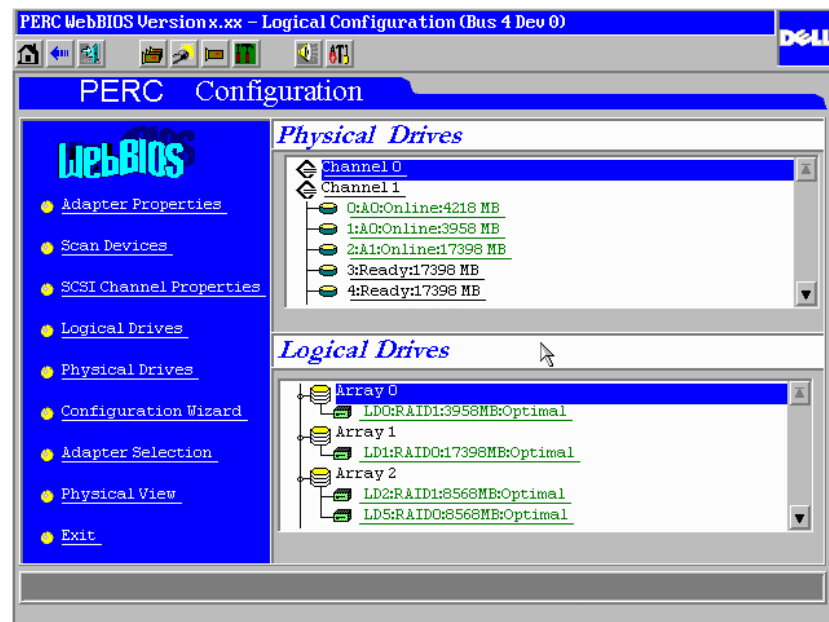
WebBIOS Toolbar Icons

Table 1-1 describes the WebBIOS toolbar icons.

Table 1-1. WebBIOS Toolbar Icons

Icon	Description
Go to Home Page	Click this icon to return to the WebBIOS main menu screen ("home page").
Go to Previous Page	Click this icon to return to the page you accessed immediately before the current page.
Exit WebBIOS Utility	Click this icon to exit the WebBIOS utility.
Adapter Selection	Click this icon to display the adapters that you can select.
Scan for Adapters	Click this icon to scan for adapters connected to your system.
Adapter Properties	Click this icon to display the properties of the adapter, such as the firmware version, BIOS version, RAM size, and initiator ID.
Configure Adapter	Click this icon to enter the Configuration Wizard.

Table 1-1. WebBIOS Toolbar Icons *(continued)*

Icon	Description
Silence the Alarm	Click this icon to turn off the sound on the alarm.
Go to BIOS Configuration Utility	Click this icon to go from the WebBIOS Configuration Utility to the BIOS Configuration Utility that resides in the firmware. The BIOS Configuration Utility (<Ctrl><M>) is used to configure and maintain RAID arrays and logical drives and to manage the RAID system. This character-based, non-GUI utility is independent of any operating system. NOTE: Refer to the *PERC 3 User's Guide* for more information about the BIOS Configuration Utility.

Adapter Properties

The **Adapter Properties** screen appears when you select **Adapter Properties** from the WebBIOS **Main Menu** screen.

WebBIOS Adapter Properties Screen

Table 1-2 describes the **Adapter Properties** menu options.

Table 1-2. Adapter Properties Menu Options

Option	Description
Firmware Version	Firmware version number
BIOS Version	BIOS version number
RAM Size	Size of the random access memory

Table 1-2. Adapter Properties Menu Options *(continued)*

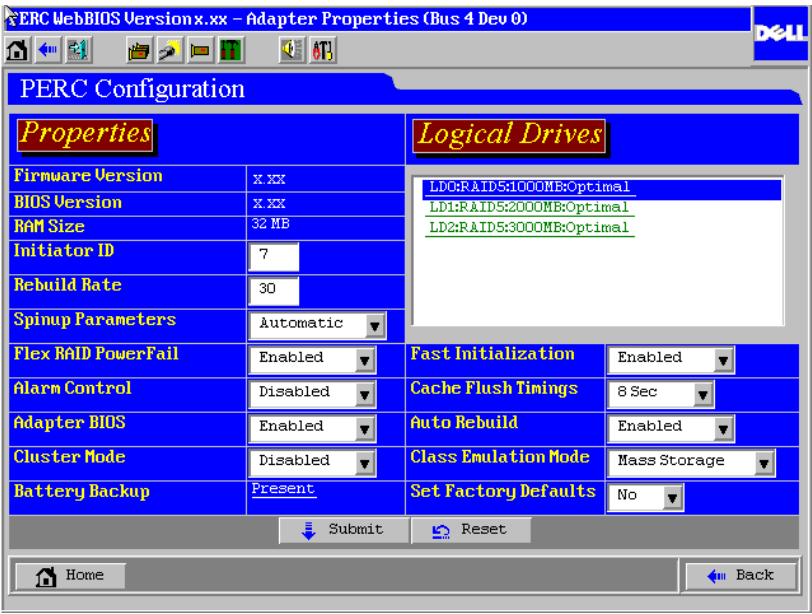| Option	Description
Initiator ID	Identifying number for the card. You can change the Initiator ID only when you are in cluster mode. You cannot change the ID while in standard mode. The ID can be a number from 0 to 15. We recommend that you use 6 or 7. When you are in standard mode, the ID is always 7.
Rebuild Rate	Selects the rebuild rate for drives attached to the selected adapter. The rebuild rate is the percentage of system resources dedicated to rebuilding a failed drive. A rebuild rate of 100 percent means the system is totally dedicated to rebuilding the failed drive. The default is 30 percent.
Spinup Parameters	Sets the timing for spinning up the hard disk drives in the computer. The options are Automatic, **2 per sec**, **4 per sec**, or **6 per sec**.
FlexRAID PowerFail	Enables or disables the FlexRAID PowerFail feature. This option allows drive reconstruction, rebuild, and check consistency to continue when the system restarts because of a power failure, reset, or hard boot.
Alarm Control	Enables, disables, or silences the onboard alarm tone generator. The alarm sounds when there is a change in a drive state, such as when a drive fails or when a rebuild is complete.
Adapter BIOS	Enables or disables the BIOS on the adapter. If the boot device is on the RAID controller, the BIOS must be enabled; otherwise, the BIOS should be disabled, or it might not be possible to use a boot device elsewhere.
Cluster Mode	Enables or disables cluster mode. Cluster mode allows the controller to operate as part of a cluster. When you disable cluster mode, the system operates in standard mode. In addition, when you enable cluster mode, the system automatically disables the BIOS. NOTE: The Cluster Mode field appears only for controllers that support clustering.
Battery Backup	Indicates whether the battery backup is present or absent. NOTE: The Battery Backup field appears only for controllers that support this feature.

Table 1-2. Adapter Properties Menu Options *(continued)*

Option	Description
Fast Initialization	When enabled, zeros are written to the first sector of the logical drive so that initialization occurs in 2 – 3 seconds. When disabled, a full initialization takes place on the entire logical drive. On a larger array (over 5 arrays), it is best to set fast initialization to **Disabled**, then initialize. Otherwise, the controller will run a background consistency check within five minutes of reboot or RAID 5 creation.
Cache Flush Timings	Selects the amount of time between cache flushes. The contents of the cache are flushed to maintain data integrity.
Auto Rebuild	When enabled, drives are automatically rebuilt when they fail.
Set Factory Defaults	Select **Yes** to load the default WebBIOS Configuration Utility settings. "Logical Drive Definition" on page 20 lists some of the default settings.

Scan Devices

When you select **Scan Devices** from the **Main Menu** screen, WebBIOS checks the physical and logical drives to see if there are any changes to the drive status. It displays the results of the scan on the **Main Menu** screen in the physical and logical drives section. For example, if a physical drive has failed, the word **Failed** displays to the right of the drive name under the **Physical Drives** heading.

SCSI Channel Properties

The **SCSI Channel Properties** screen displays when you select **SCSI Channel Properties** from the WebBIOS **Main Menu** screen:

WebBIOS SCSI Channel Properties Screen

Properties

The properties under the **Properties** heading are **Channel Width**, **Termination**, and **SCSI Capabilities**. The **Channel Width** row displays the SCSI bus width, in bits.

You can change the options for the options **Termination**, and **SCSI Capabilities**. The options for **Termination** are **Enabled**, and **Disabled**. The default is **Enabled**. The data transfer speed options for the **SCSI Capabilities** field are **Fast**, **Ultra**, **Ultra-2**, and **160M**. The default is **160M**, which is the fastest speed.

SCSI Channels

The **SCSI Channels** section of the screen lists the channels on the selected controller, and the values for the properties.

Click **Submit** to save changes to the options. Click **Reset** to undo any changes and return to the configuration that existed before you made any changes.

Other Options

The other options on this screen are:

- **Home**: Click **Home** to return to the main menu screen.
- **Back**: Click **Back** to return to the previous screen.

Logical Drives

The **Logical Drives** screen displays when you select **Logical Drives** from the **Main Menu** screen or click a logical drive in the list of logical drives on the **Main Menu** screen.

WebBIOS Logical Drives Screen
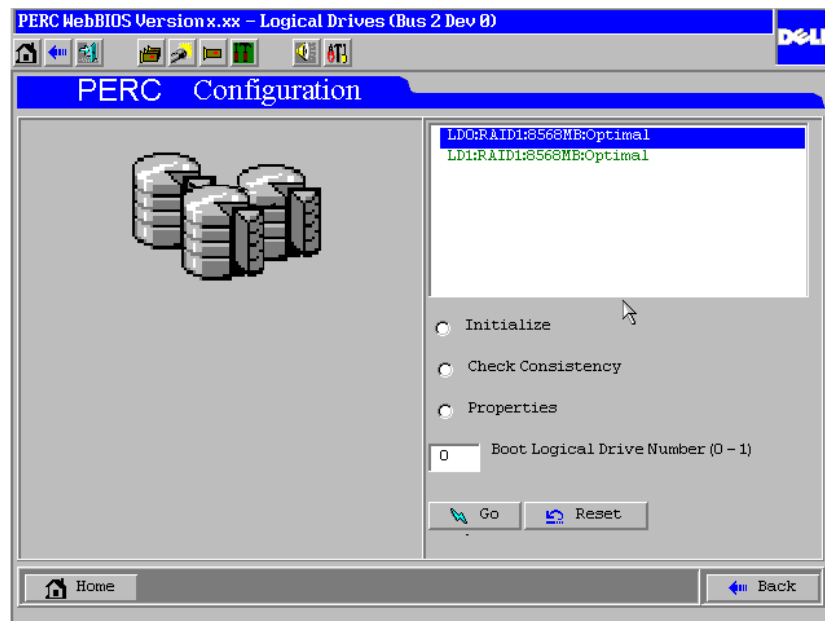
The upper right section of the screen displays the logical drives that currently exist. Below that section are options to:

- Initialize a logical drive

⚠ CAUTION: Initializing a logical drive destroys all data on the logical drive.

- Check the consistency of redundancy data on a logical drive
- Display the logical drive properties
- Boot from a logical drive

Initialize

You should use the **Initialize** option to initialize each new logical drive that you configure. Perform the following steps to initialize a logical drive:

1. Select the **Logical Drives** option from the WebBIOS **Main Menu** screen.

2. On the **Logical Drive Definition** screen, select the logical drive to be initialized.

3. Select **Initialize** below the list of drives and click **Go**.

   The progress of the initialization appears as a graph on the screen.

4. When initialization completes, click **Back** to display the previous menu.

Check Consistency

Select this option to verify the correctness of the redundancy data. This option is available only if RAID level 1, 5, 10 or 50 is selected. Check consistency automatically corrects any differences found in the data.

After you click **Check Consistency** and **Go**, a progress chart displays on the left side of the screen to show how much of the consistency check has been completed. There is also an option to abort the check for any or all logical drives.

The **Check Consistency** screen shows a check in progress.

Check Consistency Screen
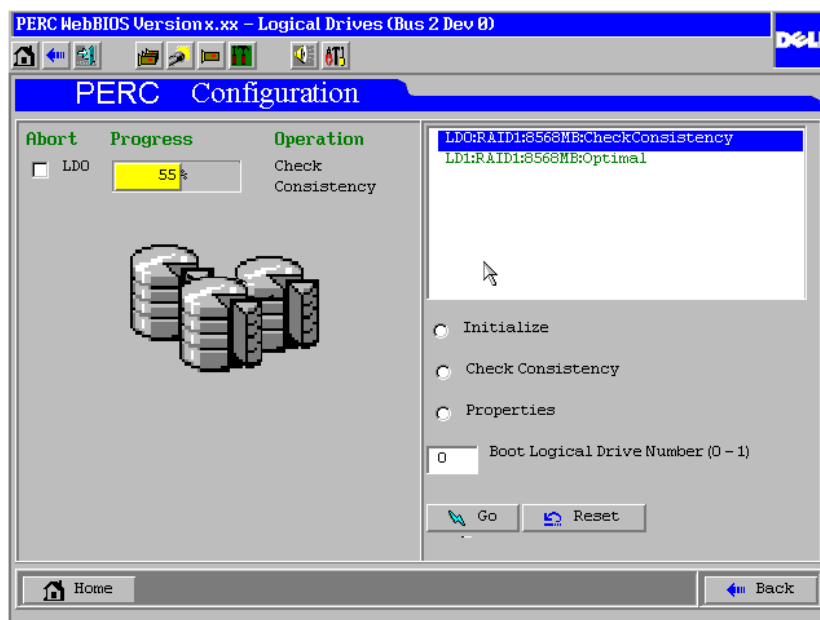
Properties

Select this option to perform the following:

- Display the logical drive properties.

- Display or change the read, write, and I/O policies.

- Enable or disable virtual sizing. (Virtual sizing allows PERC to determine the drive capacity. Set this option to **Enabled** before you add a physical drive to a logical drive. After you have created a logical drive set, the partition of the drive should be as large as the virtual size of the logical drive.)

- Start initialization

- Start a consistency check

- Remove a physical drive

- Allow RAID migration. *RAID migration* means changing the RAID level of the array. You can optionally add one or more drives to the array when you change the RAID level.

The following is an example of the **Properties** screen.

WebBIOS Properties Screen
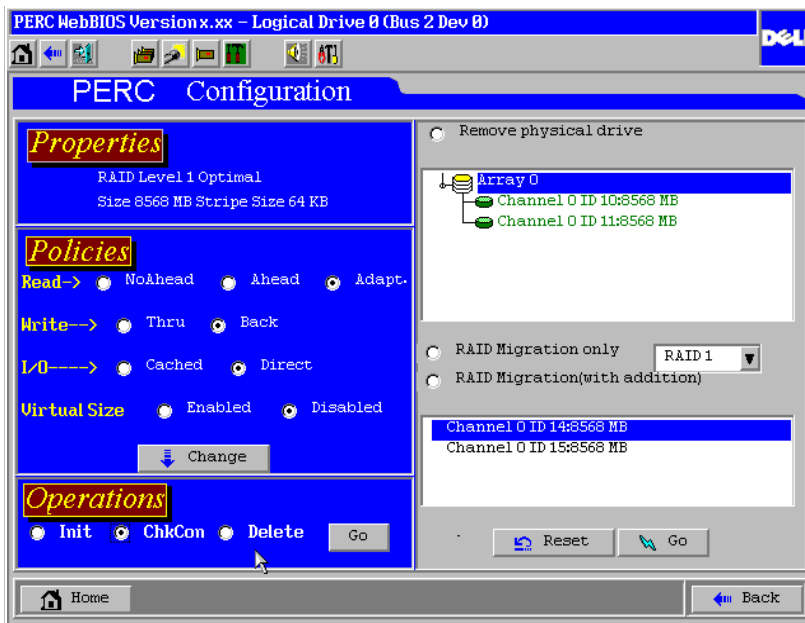
Boot from a Logical Drive

After you select a logical drive to boot from, the system boots from that logical drive when you reboot. This field is 0-n, where n = the number of logical drives created on the controller – 1. For example, it is 0-0 when there is one logical drive on the controller. Press **Go** to perform the selected action or **Reset** to delete any changes.

Physical Drives

The **Physical Drives** screen displays when you select **Physical Drives** from the **Main Menu** screen or click a physical drive in the list of physical drives on the **Main Menu** screen.

WebBIOS Physical Drives Screen
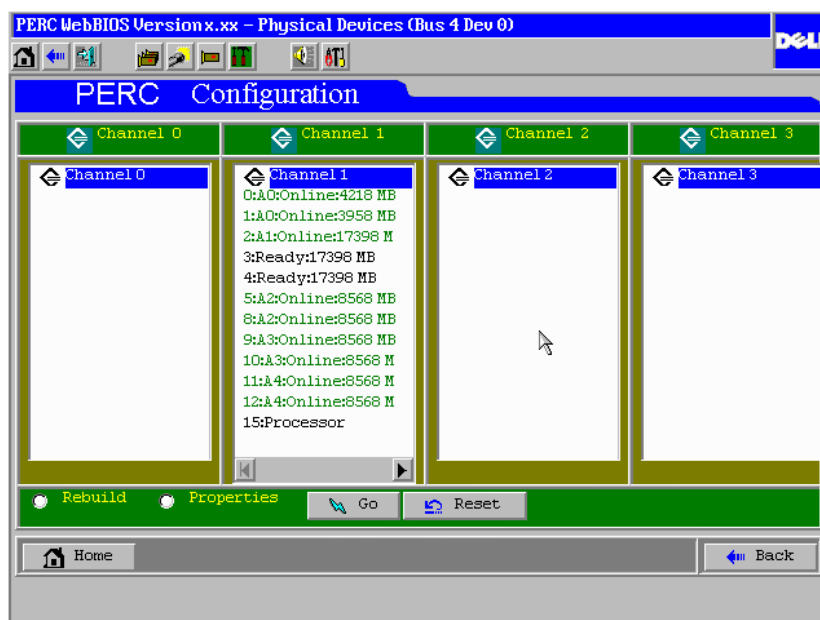
This screen displays the physical drives for each channel. From this screen, you can rebuild the physical arrays or view the properties for the physical drive you select. Select **Rebuild** or **Properties** and click **Go** to perform these actions. Press **Reset** to return to the configuration that existed before you made any changes.

Configuration Wizard

The **Configuration Wizard** screen displays when you select **Configuration Wizard** on the WebBIOS **Main Menu** screen.

Configuration Wizard Screen
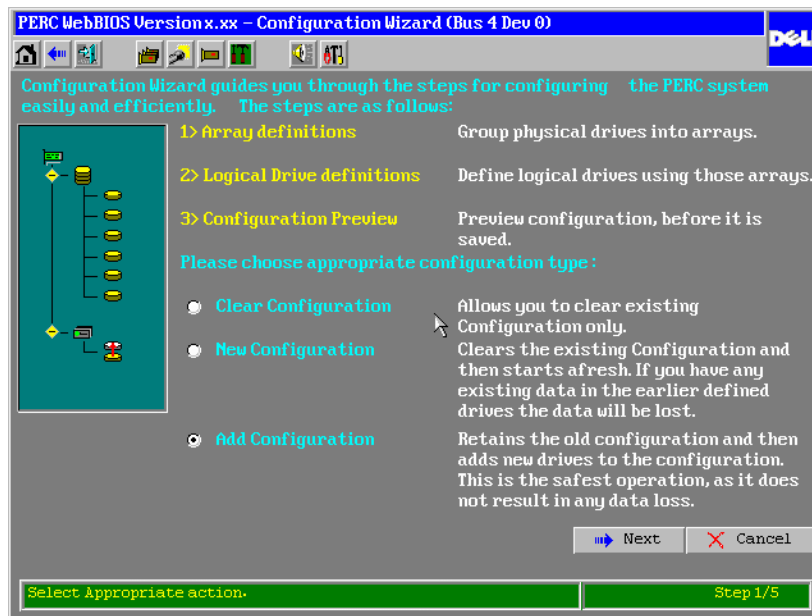
On this screen, you can begin the procedure to clear a configuration, create a new configuration, or add a configuration. After you select one of the options, click **Next** to go to step 2/5.

Select Configuration

Step 2/5 displays on the **Select Configuration** screen. On this screen, you can select custom configuration, auto configuration with redundancy, or auto configuration without redundancy.

Select Configuration Screen
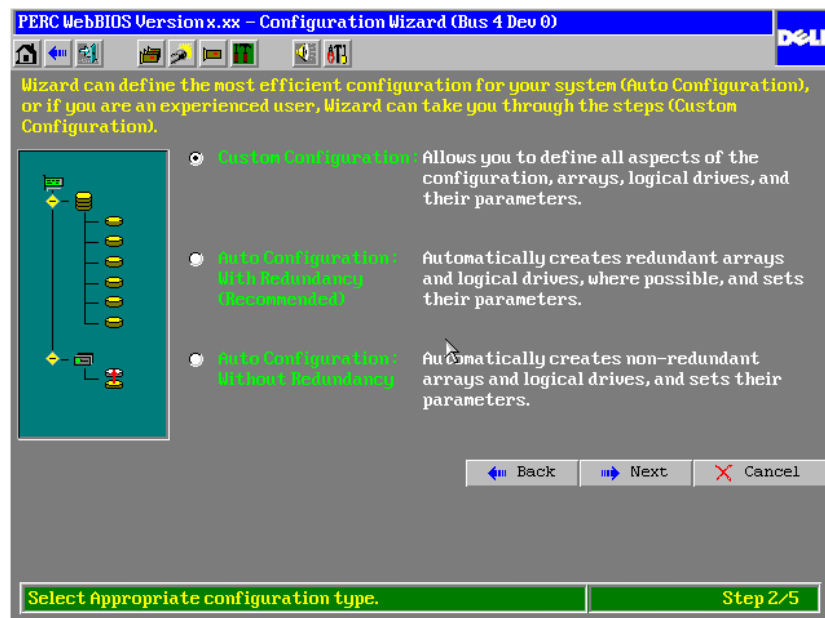
Click **Next** to go to Step 3/5 after you select the type of configuration.

Array Definition

The **Array Definition** screen displays next. To add drives to an array, press and hold the Ctrl key while you select "ready" drives on the left side of the screen. Click **Accept Array** to add the drives. To undo the changes, press **Reclaim**. Click **Next** to go to Step 4/5. The **Array Definition** screen shows an example of an array being added.

Array Definition Screen
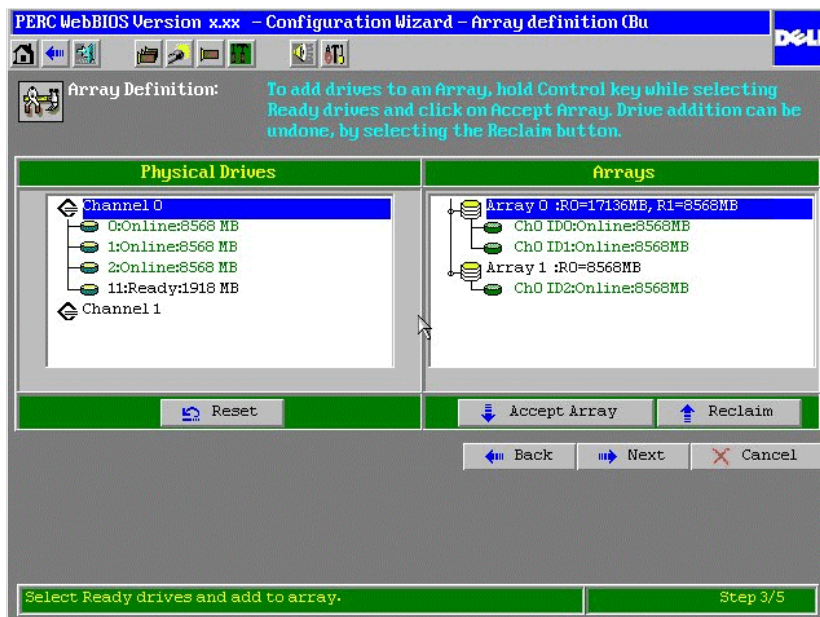
In the **Arrays** window, on the right side of the screen, the **Array** heading displays the amount of space available on the hard drives, depending on the RAID level selected. For example, Array 0 has a capacity of 17136 MB as RAID 0 (striping), and 8568 MB as RAID 1 (mirroring.) RAID 0 offers the combined capacity of both drives. RAID 1 offers half the capacity of the two drives (or the capacity of the smaller of two drives, if they are not the same size.)

Logical Drive Definition

The **Logical Drive Definition** screen displays for Step 4/5. Click a logical drive to display the following screen for that drive. Use this screen to configure the logical drive:

Logical Drive Definition Screen
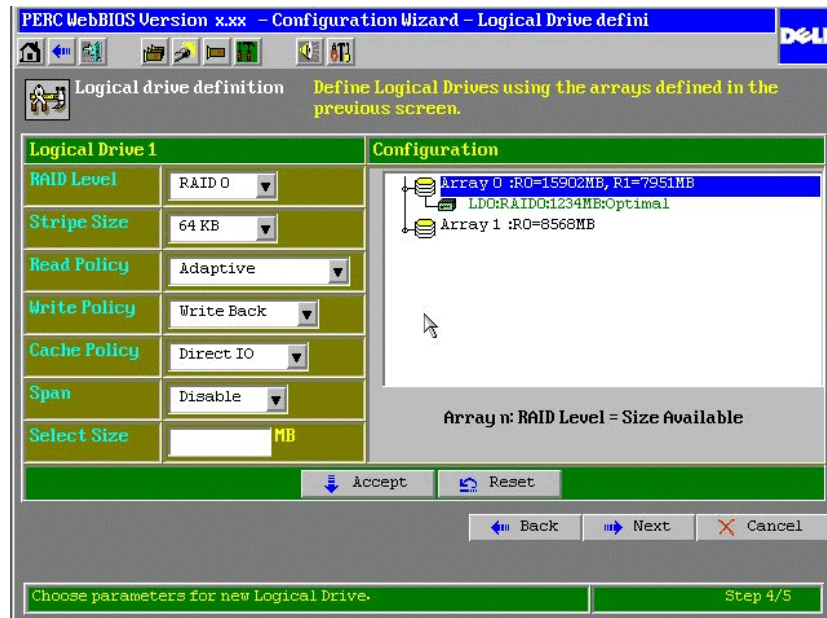
Perform the following steps to configure logical drive policies.

1   Click the down arrow the box to the right of the **RAID Level** field to display the possible RAID levels for the logical drive.

2   Select a RAID level.

3   Select the **Stripe Size**.

The **Stripe Size** specifies the size of the segment written to each disk in a RAID 1, 5, 10, or 50 logical drive. You can set the stripe size to **2 KB**, **4 KB**, **8 KB**, **16 KB**, **32 KB**, **64 KB**, or **128 KB**. The default is **64 KB**.

NOTE: Only applicable RAID levels can be chosen. For example, if there are two drives, you cannot select RAID 5, which requires a minimum of three drives.

A larger stripe size produces higher read performance, especially if your computer does mostly sequential reads. However, if your computer does random read requests more often, choose a smaller stripe size. Select the stripe size based on your performance testing.

4   Select the **Read Policy**.

The **Read Policy** controls the SCSI read-ahead feature for the logical drive. During a read operation, the read-ahead policy determines whether the controller reads additional data records into cache. The read-ahead feature allows your system to predict the next data that will be read. If an application program reads data sequentially (as the disk stores data), then read-ahead will improve performance, as this reduces the time needed to access the data. Select the read policy based on your performance testing. The options are as follows:

–   **Normal**: The controller does not read additional records into cache.

–   **Read-ahead**: The controller reads additional records into cache.

–   **Adaptive** *(default):* The controller begins using read-ahead if the two most recent disk accesses occurred in sequential sectors. If all read requests are random, the read policy reverts to **Normal***;* however, all requests are still evaluated for possible sequential operation. **Adaptive** read-ahead is a good choice because it speeds sequential read operations.

5   Select the **Write Policy**.

The **Write Policy** specifies whether I/O completion is signaled when data is transferred to the cache or when it is written to disk. The options are as follows:

–   **Write-back**: The controller sends a data transfer completion signal to the host when the controller cache has received all the data in a transaction.

–   **Write-through** *(default):* The controller sends a data transfer completion signal to the host when all data in a transaction is written to disk.

Write-through caching provides better data security than **write-back** caching, and **write-back** caching offers higher throughput than write-through caching. **Write-back** is safe to use only if the RAID controller has battery-backed cache. Select the write policy based on your performance testing.

6   Select the **Cache Policy**.

The **Cache Policy** determines whether reads for a specific logical
driver use cache memory. It does not affect the **Read-ahead** cache.
The options are as follows:

– **Cached I/O***: A*ll reads are buffered in cache memory.

– **Direct I/O** *(default):* Reads are not buffered in cache memory.
Direct I/O does not override the cache policy settings. Data is
transferred to cache and the host concurrently. If the same data
block is read again, it comes from cache memory.

7   Enable or disable the **spanning mode** for the current logical drive.

If enabled, the logical drive can occupy space in more than one array. If
disabled, the logical drive can occupy space in only one array.

For two arrays to be spannable, they must have the same stripe width
(they must contain the same number of physical drives) and they must
be consecutively numbered. For example, assuming Array 2 contains
four disk drives, it can be spanned only with Array 1 and/or Array 3,
and only if Arrays 1 and 3 also contain four disk drives. If the two
criteria for spanning are met, spanning is automatically allowed. If the
criteria are not met, the **Span** setting makes no difference for the
current logical drive.

8   Select the size of the logical drive in megabytes (MB.)

The maximum size allowed for the RAID configurations displays on
the screen.

9   Click **Accept** to accept the changes or click **Reset** to delete the changes
and return to the previous settings.

Configuration Preview

Step 5/5 displays a preview of the configuration that you have create in the shown in **Configuration Preview** screen. Click **Accept** to save the configuration or **Back** to return to the previous screens and change the configuration.
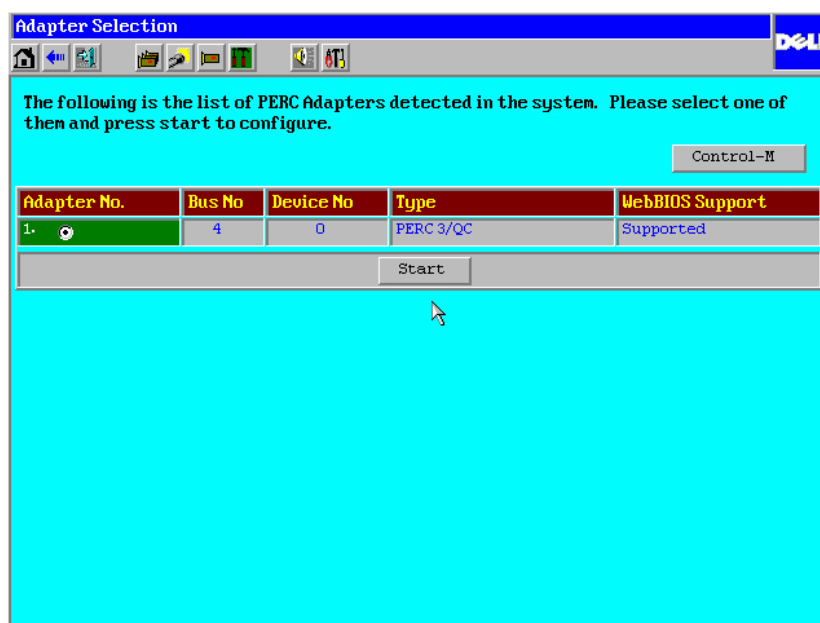
Configuration Preview Screen
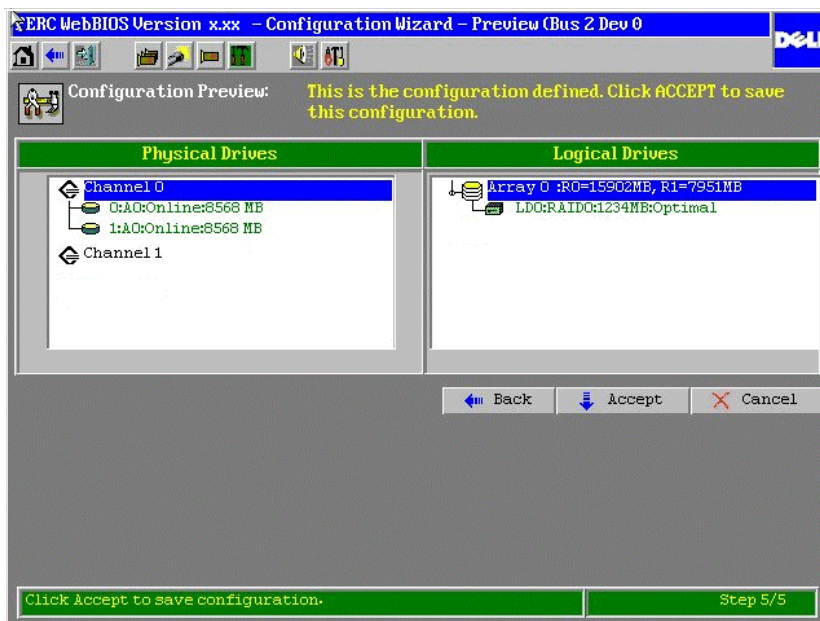
Adapter Selection

When you select **Adapter Selection** on the WebBIOS **Main Menu** screen, the **Adapter Selection** screen displays a list of the Dell PERC 3 adapters in the system. (This screen also appears when you first start the WebBIOS utility.) To begin configuration, select an adapter and click **Start**.

WebBIOS Adapter Selection Screen

Physical View\Logical View

The **Physical View** and **Logical View** display on the WebBIOS **Main Menu** screen. The option toggles between the **Physical View** and the **Logical View** of the logical drive. For example, if you select **Physical View** on the screen below, the option changes to **Logical View**. If you then click **Logical View**, the option changes back to **Physical View**. This allows you to go back and forth between physical and logical views.

WebBIOS Physical View/Logical View
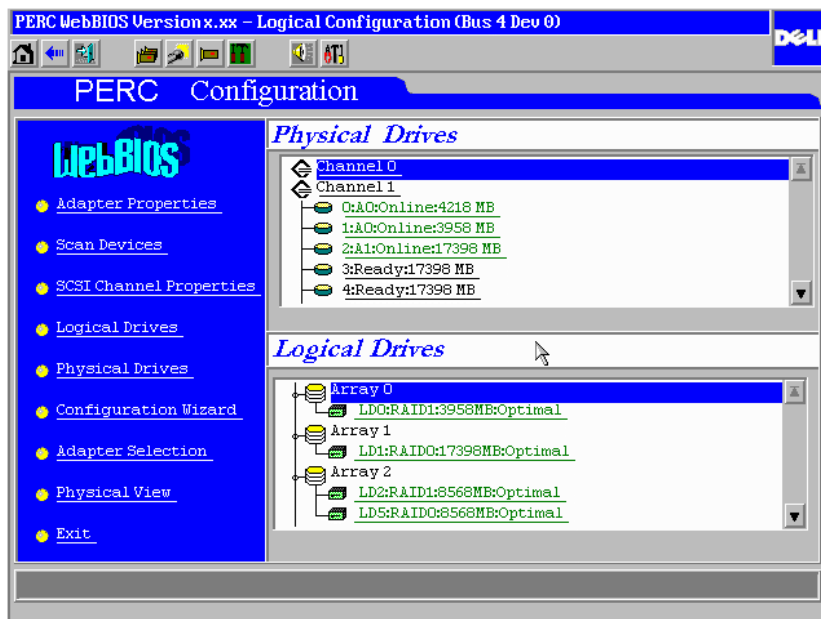
Configuration Mismatch

A configuration mismatch occurs when the data in the non-volatile random access memory (NVRAM), and the hard drives are different. The **Configuration Mismatch** screen provides three ways to resolve a configuration mismatch:

- Select **Create New Configuration** to delete the previous configuration and create a new configuration.
- Select **View Disk Configuration** to restore the configuration from the hard disk.
- Select **View NVRAM Configuration** to restore the configuration from the NVRAM.

Configuration Mismatch Screen
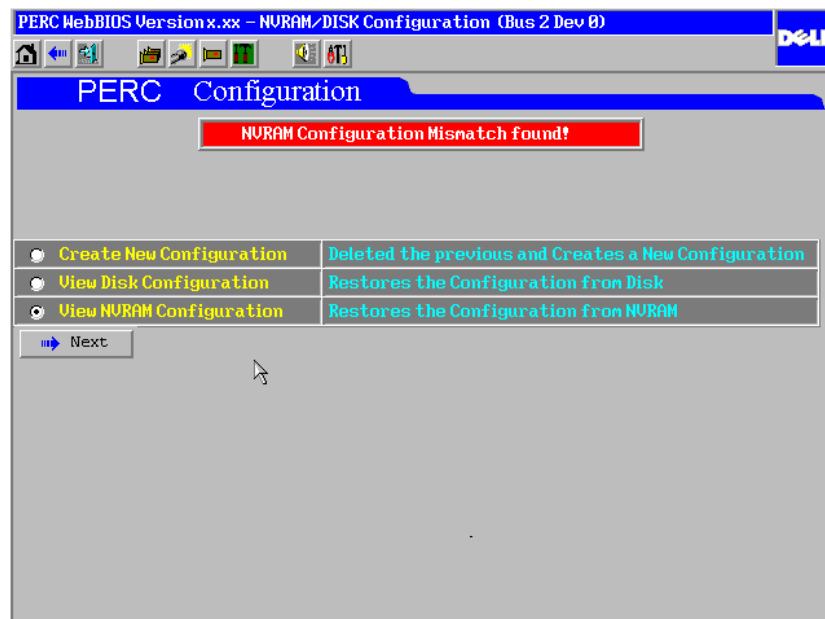
Random Array Deletion

The PERC controllers support random array deletion. Random array deletion is the ability to delete any unwanted logical drives and use that space for a new logical drive.

Overview

The main benefit is that you are no longer restricted to sequential or contiguous logical drives when you create logical drives. You can use WebBIOS to create the next logical drive from the non-contiguous free space ('holes'), and from the newly created arrays. WebBIOS provides a list of configurable arrays in which there is a space to configure.

The random deletion of logical drives creates non-contiguous segments in the configuration, which prevents the sequential creation of the next logical drive. You can create logical drives from these non-contiguous segments. To create such a logical drive, you can span these segments, as long as they have the same number of physical drives.

You can still create sequential logical drives, without using the non-contiguous segments. WebBIOS provides information about sequential segments, non-contiguous segments and physical drives that have not been configured. You can use this information when you create logical drives.

⚠ CAUTION: The deletion of the logical drive can fail under certain conditions. You cannot delete a logical drive during a reconstruction.
Deletion can fail during a rebuild, initialization or check consistency of a logical drive, if that drive has a higher logical drive number than the drive you want to delete.

📝 NOTE: Drive size expansion is not possible, even though you can use non-contiguous free space to create a new logical drive. In addition, you cannot move an existing logical drive to another area to protect it from defragmentation caused by random deletion.

NOTE: When a 'delete' request reaches the operating system driver, the driver stops all the running input/output (I/O) for other logical drives and processes the delete request first. Normal read/write operation resumes after the delete request is completed.

NOTE: The available space is shown on the **Array Definition** screen, on page 19. In the **Arrays** window, on the right side of the screen, the **Array** heading displays the amount of space available on the hard drives, depending on the RAID level selected.

Configuration Constraints

The configuration procedure is affected by the random array deletion feature. The following is a list of constraints to consider when you configure arrays and logical drives.

- If you create more than one array, you can choose to create logical drives from any array by selecting the particular array.

- The array need not be completely consumed to jump to another array. You can leave space in an array and proceed to configure in another array.

- The available space appears beside each array for possible RAID levels.

- When you delete a logical drive from an array, in the configuration screen, the available space shown is the size of the *first* hole (non-contiguous segment) in the array.

- Since configuration is allowed in any array in any sequence, the RAID level option shown in the **Logical Drive Definition** screen on page 20 is not automatic. You have to choose the RAID level for each logical drive.

- For the same reason as above, spanning is *not* automatic. You must choose the arrays across which to span the logical drive. Spanning can be across any array; they do not need to be contiguous.

- If any two arrays have an equal number of stripes and have holes, those holes can be spanned by selecting those arrays.

- To delete a logical drive, click the logical drive. The **Logical Drive Properties** page displays. You can choose **Delete**, then press **Go**. WebBIOS deletes the logical drive and displays the space of the first hole beside the array number in the configuration screen.

  Delete is not allowed when any of the following operations is in progress:
 – Reconstruction
  – Rebuild
  – Check consistency
  – Background initialization

Procedure for Deleting Logical Drives

To delete logical drives in WebBIOS, perform the the following steps:

1   On the **Main Menu** screen, click **Logical Drives**.

    The **Logical Drive** screen displays.

2   On the **Logical Drive** screen, click **Properties**, then click **Go.**

3   The **Properties** screen displays.

4   Select a logical drive.

5   In the **Operations** section of the screen, select **Delete** and click **Go**.

    This deletes the logical drive.

Properties Screen
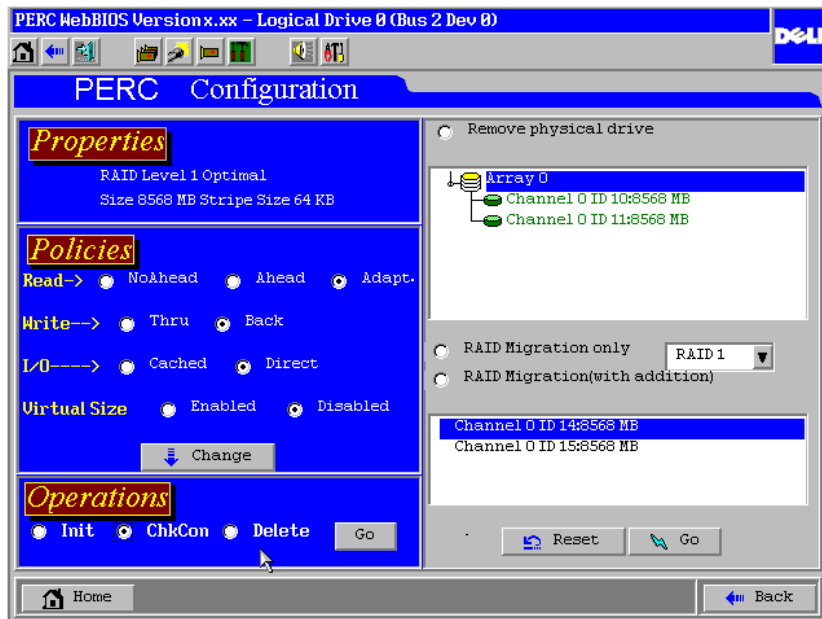
When you configure another array, you can use the space made available from the logical drive you deleted. The **Array Definition** screen shows the amount of space available. See the section about the Configuration Wizard, starting on page 17, for more information about configuring arrays.

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